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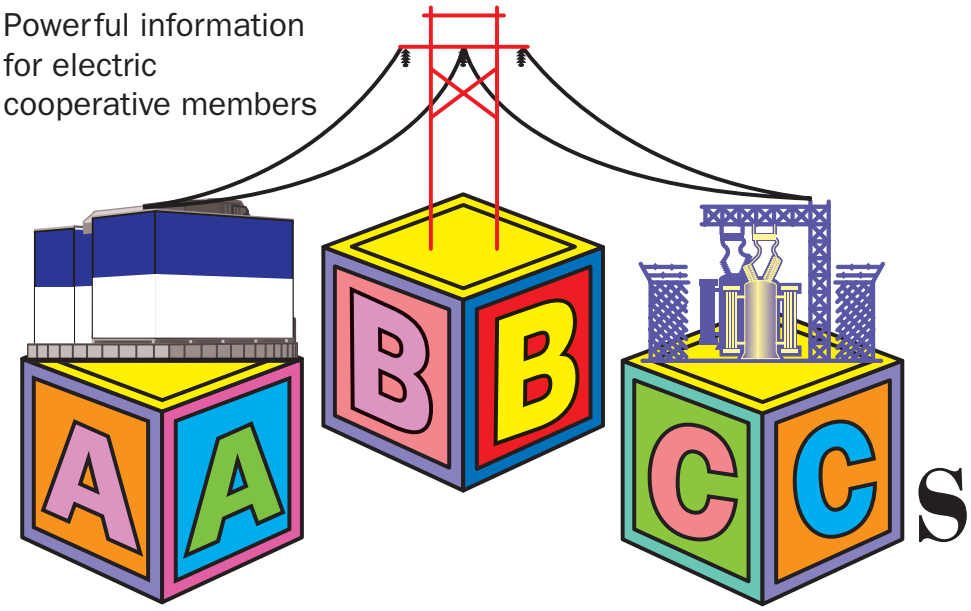

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First in a three-part series about how electricity is produced, transmitted and delivered to cooperative members

By David Logeman, Contributing Writer

Every time a cooperative member flips a light switch, three kinds of service come into play to make electricity turn on the lights. First, the electricity itself has to be created, or generated, in a power plant. Secondly, it has to be transmitted long distances, at high voltages, and delivered to a substation. There, thirdly, it has to be transformed back to a lower voltage and delivered to the member's home where the switch is flipped. This very simplified example demonstrates the process necessary to produce and deliver power for use in homes, and businesses, and factories throughout our state.

In this three-part series of articles, we will look at each of the steps necessary to deliver electricity to cooperative members and some of the issues and challenges surrounding them. The first installment in this series talks about the generation of electricity to meet the projected needs of a growing South Carolina.

Generation of electricity, in simplest terms, is the conversion of the energy contained in a fuel to electricity. This fuel can be a fossil fuel such as coal or natural gas, or it can be another type of fuel such as uranium, or even the energy stored in wind and water. In all of the fuels listed, all of them except wind and water are used to create heat. This heat in turn boils water, which then creates steam. The steam is then used to spin a turbine which creates the electricity in a generator. In a manner of speaking, generating electricity is all about boiling water. In the case of hydroelectric generation, water, of course, isn't burned. Water essentially falls through a turbine to create the motion necessary to spin the turbine, much in the way falling water turns a water wheel. What is common for all of the methods by which electricity is generated is the spinning motion, needed to turn the magnets inside the wiring of the generator to produce electricity. Many remember hand-crank generators and even telephones that were activated by a crank mechanism. The purpose of that crank was to produce the first small amount of electricity necessary to carry the voice signal to the telephone operator. Today's electric generating plants, producing billions of watts of power, are in many ways gigantic versions of those old crank generators.

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Except for a relatively small but growing amount of renewable energy from wind, solar, landfill gas and other sources, electricity is primarily generated in fossil fuel plants burning either coal or natural gas. Nuclear power makes up about 20 percent of the power generated in the United States and a significant portion of the power generated in South Carolina. When looking at the fuels used to produce power for the electric cooperative system in South Carolina, the primary fuel is coal. Coal generation accounted for about 78 percent of the average of 1,805 megawatts of power consumed by cooperative members in 2005. A megawatt is about enough power for 250 homes. Virtually tied for second place were natural gas and nuclear at around 10 percent each. The remainder of the power came from hydroelectric facilities, and even some renewable resources such as landfill gas.

As you might expect, building power plants is increasingly challenging and expensive. The challenge lies in piecing an intricate puzzle of tangibles, such as land, steel and concrete, together with intangibles, such as predictions relating to future costs of fuel — all to determine the best value for consumers. For a typical plant under construction, the cost of choosing a site, permitting, and construction can run more than $1 billion. And these costs are rising. To further complicate the picture, the time it takes to build a power plant can range from six to 15 years.

Planning for demand

Cooperatives are looking ahead and making plans to meet power requirements for the next 20 years and beyond. Long-range planning is constantly under way to ensure that power will be there when needed to meet future peak electrical demand, which last year exceeded 3,360 megawatts on the hottest day and 3,200 on the coldest day.

Land is becoming ever more expensive. The task of acquiring a new power plant site is more difficult every day. Power plants are big, and they require large spaces to operate. They need to be situated near bodies of water or rivers so that the water can be used as cooling for the production process. The availability of roads and, sometimes, rail is essential. And finally, while all of us are requiring more and more electricity to run

our homes and businesses, no one wants to live next door to a power plant. Nevertheless, more power plants are needed, and they are needed more frequently. These challenges are becoming more and more difficult. The process of getting permission from the public and governmental agencies to build power plants is daunting.

As with any very large construction project, construction costs are sometimes difficult to control. Once permission to construct the plant has been obtained, financing has to be secured. Construction will require that practically all funds necessary to build the plant be spent before a single dollar in revenue, to pay for the plant, can be collected from consumers. Building a power plant requires a stable and secure company that can borrow the funds needed and still be able to pay debt obligations to its bankers and consumers.

Choices, choices

Once a plant has been built and is ready for operation, the last piece of the puzzle has to be placed. The fuel to be consumed in the plant has to be delivered. Whether it is natural gas, coal, uranium, or an alternative fuel such as landfill gas, the fuel has to be procured. Each has its own unique advantages —and problems. In the case of nuclear power, the most obvious challenge lies in the very nature of the fuel itself. Uranium is radioactive. Secondly, after it's been used and needs to be replaced, it's no easy task to refuel a nuclear power plant. And then there's the waste problem. On the plus side, however, for the amount of heat that can be generated per unit of fuel, nuclear is inexpensive compared to coal, and especially to natural gas. Other than water and wind, where the cost of the fuel is essentially free, there is no cheaper way to generate electricity than nuclear power on a fuel cost per unit of electricity generated. On the other hand, there is no more expensive power plant to build than a nuclear power plant. Capital costs have, over the past thirty years or so, more than offset the fuel savings of nuclear power. As coal and gas prices have risen dramatically, and with the mounting costs and problems associated with all fossil fuels, many electric utilities, including those in South Carolina, are considering construction of new nuclear power plants. That's striking when you consider that a new nuclear power plant has not been built in this country for more than thirty years. Nuclear power plants are, however, being built in many parts of the world including both Europe and Asia.

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Fossil fuels such as coal and natural gas pose additional concerns other than raw resource costs. Cleaning up greenhouse emissions and other environmental considerations are driving up the costs of building and operating these types of plants. Changes in federal law pose challenges. Coal costs are rising dramatically as power companies compete for higher qualities of coal in order to meet increasingly more stringent mandates for emission standards for limiting sulfur dioxide and other emissions. Power companies who have large needs for coal generation can buy emission allowances, in a competitive market, from companies who do not need them. The cost of these allowances follows the law of supply and demand, and they are in great demand. The 2006 cost of allowances for the cooperatives' power supply will more than double from 2005 levels. Add that to higher coal prices. The dramatic rise in coal and allowance costs is having a major impact on the price electric cooperatives pay for wholesale power.

Renewable alternatives

Currently, two new coal-fueled plants and smaller landfill-gas-fueled "Green Power" plants are being built to serve the power needs of your electric cooperative. The coal-fired plants are on existing sites and will be outfitted with advanced environmental safeguards. The first of these units will be available for use in 2007 and the second one, in 2009. The new Green Power plants complement a growing mix of alternative energy to help meet consumer demand. Members who buy Green Power do so voluntarily, and its added cost supports the development of alternative energy in South Carolina. Cooperatives are looking ahead and making plans to meet power requirements for the next 20 years and beyond. With construction lead times of six to 15 years, long-range planning is constantly under way to insure that power will be there when needed. New technologies such as offshore wind generation, solar, hydrogen fuel cell and other energy sources are being explored. Costs are being weighed to try and assure that whatever future prices of power production may be, we are delivering the most lowest-cost power possible and serving the needs of cooperative members judiciously.

David Logeman is Director of Power Supply for Central Electric Power Cooperative, which transmits and provides power generated by the state-owned utility, Santee Cooper, and others, to your electric cooperative. He lives in Columbia.